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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/661,547	09/15/2003	Pooran C. Joshi	ARL 00-34A	9057

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EXAMINER

THOMAS, TONIAE M

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 09/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/661,547

Applicant(s)

JOSHI, POORAN C.

Examiner

Toniae M. Thomas

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☒ Claim(s) 7 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

1. This action is a first Office action on the merits of Application Serial No. 10/661,547, which is a divisional of Application Serial No. 09/855,549 - now abandoned, which claims benefit of provisional Application Serial No. 60/205,140. The preliminary amendment filed on 08 March 2004 cancelled claims 8-16. Currently, claims 1-7 are pending.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

2. *Claims 1-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.*

The claim language “the thin film substrate heterostructure” recited in claim 1 lacks antecedent basis (claim 1, lines 12-13). For purposes of examination, the claimed language is interpreted to mean “composite thin films.” The claim language “composite thin films” is recited in the preamble of claim 1.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole

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would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. *Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tomita (US 5,468,514) in view of Huang et al. (US 6,133,086).*

The Tomita patent (Tomita) discloses a method for fabricating composite thin films (see embodiment of fig. 1 and col. 2, line 64 - col. 3, line 3). The method comprises the steps of: (a) depositing a chemical precursor solution onto a suitable substrate and forming a wet film of Ta<sub>2</sub>O<sub>5</sub> (col. 2, line 64 - col. 3, line 25); (b) baking the wet film and removing organics present in the solution (col. 3, lines 26-28); (c) forming a continuous Ta<sub>2</sub>O<sub>5</sub> thin film on the substrate (col. 3, lines 26-28); (d) baking the continuous Ta<sub>2</sub>O<sub>5</sub> thin film (col. 3, lines 28-31); and (e) repeating steps (c) and (d) to obtain a desired thickness of the thin film (col. 3, lines 38-42).

The method further comprises the steps of: selecting precursor compounds and solvents, and forming the chemical precursor solution, *as recited in claim 2* (col. 2, line 64 - col. 3, line 25); dissolving the precursor compounds in the solvents and forming a homogenous solution, *as recited in claim 3* (col. 2, line 64 - col. 3, line 25); and hydrolyzing and polycondensating the precursor solution and stabilizing the precursor solution, *as recited in claim 4* (col. 2, line 64 - col. 3, line 25).

Tomita differs from the claimed invention in not teaching an annealing step, wherein the continuous Ta<sub>2</sub>O<sub>5</sub> thin film is annealed at varying

temperatures, times and oxygen flow rates, *as recited in claim 1*. The Huang et al. patent (Huang) discloses a method for forming a Ta<sub>2</sub>O<sub>5</sub> thin film (see fig. 2 and col. 3, lines 7-52). The method for forming the Ta<sub>2</sub>O<sub>5</sub> thin film comprises annealing the thin film at varying temperatures and times (col. 3, lines 35-48).

While Huang discloses annealing the Ta<sub>2</sub>O<sub>5</sub> at varying temperatures and times, Huang does not explicitly teach annealing at varying oxygen gas flow rates. However, Huang does teach conducting the annealing operation in an oxygen atmosphere (col. 3, lines 35-41). This requires turning on a flow of oxygen inside the process chamber during the annealing operation. Thus, given the broadest possible reasonable interpretation, consistent with Applicant's specification, turning the oxygen gas flow on inside the process chamber during the annealing operation meets the claim limitation of "annealing at varying oxygen gas flow rates" as recited in claim 1.

Since both Tomita and Huang are from the same field of endeavor, the teaching for which Huang is relied upon would have been recognized in the pertinent reference of Tomita by one of ordinary skill in the art at the time the invention was made.

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify Tomita in view of Huang by annealing the continuous Ta<sub>2</sub>O<sub>5</sub> thin film at varying temperatures, times and oxygen flow rates, *as recited in claim 1*, since the Ta<sub>2</sub>O<sub>5</sub> thin film formed therefrom is in a crystalline state (Huang - col. 3, lines 49-51). A crystalline Ta<sub>2</sub>O<sub>5</sub> thin film has

a high dielectric constant and low dielectric loss at microwave frequencies. The annealing operation, therefore improves the electrical and mechanical properties of the Ta<sub>2</sub>O<sub>5</sub> thin film.

Tomita does not explicitly teach utilizing ambient conditions during the step of baking the continuous Ta<sub>2</sub>O<sub>5</sub>, *as recited in claim 1*, and during the step of baking the wet film of Ta<sub>2</sub>O<sub>5</sub>, *as recited in claim 5*; or controlling the ambient conditions during the step of baking the wet film of Ta<sub>2</sub>O<sub>5</sub>, *as recited in claim 6*. However, utilizing and controlling ambient conditions during baking operations is routine and within ordinary skill. Thus, the steps of utilizing and controlling ambient conditions, as recited in claims 1, 5, and 6, are taken to be obvious over the combination of Tomita and Huang.

***Allowable Subject Matter***

4. *Claim 7 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.* Whereas Tomita discloses baking a wet Ta<sub>2</sub>O<sub>5</sub> film after depositing the wet Ta<sub>2</sub>O<sub>5</sub> film, forming a continuous Ta<sub>2</sub>O<sub>5</sub> thin film, and baking the continuous Ta<sub>2</sub>O<sub>5</sub> thin film, Tomita does not anticipate, teach or suggest an intermediate drying step between the step of baking the wet Ta<sub>2</sub>O<sub>5</sub> film and the step of baking the continuous Ta<sub>2</sub>O<sub>5</sub> thin film, *as recited in claim 7*. There is no teaching or suggestion within the other prior art of record to modify Tomita by performing an intermediate drying

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step between the step of baking the wet Ta<sub>2</sub>O<sub>5</sub> film and the step of baking the continuous Ta<sub>2</sub>O<sub>5</sub> thin film.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toniae M. Thomas whose telephone number is (571) 272-1846. The examiner can normally be reached on Monday-Thursday from 8:30 a.m. to 5:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*MMJ*

17 September 2004



**Mary Wilczewski**  
Primary Examiner